page 41, dated '*30 Novembre, 1877*,' M. Gervais gives the reasons for publishing the second chapter first, and states that the first and third chapters will probably appear during the year 1878. From this statement it is evident that *Proechidna* could scarcely have been published prior to December 1, 1877. The Annual Record of Science and Industry for 1876, on the other hand, was received at the Library of Congress, Washington, D. C., on April 28, 1877. This date, however, may be the date of entry for *copyright*, and does not necessarily show that the book was issued on April 28. A copy of the same volume in the library of the U. S. Patent Office, Washington, D. C., was received early in May, while the publishers, Messrs. Harper & Brothers, give the exact date of publication as May 5, 1877.

The synonomy of the genus should stand:

Zaglossus Gill, May 5, 1877.

Acanthoglossus Gervais, Nov. 5, 1877 (Date of reading, *not* of publication).

Proechidna Gervais, Nov. 30, 1877 (Date of prefatory foot-note).

Bruynia Dubois, ———, 1882.

The evidence seems sufficient to show that *Zaglossus* was published at least as early as May 5, 1877, and, therefore, antedates *Acanthoglossus* by six months and *Proechidna* by nearly seven months.

T. S. PALMER.

WASHINGTON.

CORRESPONDENCE.

SPECTROSCOPIC OBSERVATIONS OF SATURN AT THE ALLEGHENY OBSERVATORY.

TO THE EDITOR OF SCIENCE: As certain observations of mine on the spectrum of Saturn have been widely noticed by the daily press, and various reports have been spread, some of which are correct and some incorrect, but none of which were made by my authority, I take this opportunity to explain the real character of the observations. It is hardly necessary for me to say here that I have made no 'claims' whatever respecting them.

The observations furnish a direct proof of the accepted hypothesis that the ring of Saturn consists of a multitude of small bodies revolving around Saturn in circular orbits. The hypothesis is an old one, but its universal acceptance dates from the publication of Maxwell's prize essay in 1859. While the mathematical proofs given by Maxwell and his predecessors are conclusive, a demonstration of the hypothesis by the widely different method of direct observation with the spectroscope is not, I think, without interest.

The proof depends upon an application of the well-known principle of Doppler, by which the motion of a heavenly body in the line of sight can be determined by measuring the displacement of a line in its spectrum. Under the two different hypotheses, that the ring is a rigid body, and that it is a swarm of satellites, the relative motion of its parts would be essentially different; hence, to distinguish between these two hypotheses it is only necessary to find a method of sufficient delicacy, in order to bring the question within the province of the spectroscope. Any method depending on the successive comparison of the spectra given by different parts of the ring would be almost certain to fail. The method which I have employed is explained below.

If two planes, at right angles to each other, are passed through the observer and the system of Saturn, one (A) passing anywhere through the system and the other (B) through its center, the velocity, resolved in the direction of the line of sight, of any point on the surface of the system where it is intersected by plane A can be expressed as a function of the perpendicular distance of the point from plane B. It is only necessary to consider the case when the plane A is parallel to the major axis of the apparent ring. On the assumption that the

ball of Saturn rotates as a solid body, and the ring as an assemblage of particles, each of which moves with a velocity determined by Kepler's third law, the expressions for the ball and for the planet are very different, the former being linear, and the latter an equation of a degree higher than the second. I have determined these expressions for the special case above mentioned. They are still further simplified by assuming that plane A also passes through the center of the planet.

Now, if we bring the image of Saturn, formed by a telescope, upon the slit of a spectroscope, with the slit in the intersecting plane A, the expressions above referred to are also the equations to the curves of which the lines in the spectrum of the planet are a part, referred to an undisplaced spectral line and the perpendicular line through its center as axes; for, in these curves, x is proportional to the perpendicular distance from plane B, and, by Doppler's principle, y is proportional to the velocity in the line of sight. The simplest case is, of course, that in which the slit coincides with the major axis of the ring; this is also the condition for which the differential velocity of points on the surface of the ring is a maximum, and it is one which can be approximately realized in observation.

Hence the laws of rotation of the component parts of the system can be determined (within certain limits) by the *form* of the special lines, and the form can be determined with very considerable accuracy by photographing the spectrum with a suitable instrument.

According to the assumptions which have been made above, and which represent the accepted hypothesis, lines in the spectrum of the ball are straight, but inclined; as compared with their direction the general inclination of the (theoretically) curved lines in the spectra of the opposite sides of the ring is smaller, and it is *reversed*. The actual aspect of the lines on my photographs is in exact accordance with that required by the hypothesis.

If the ring rotated as a whole, the lines in its spectrum would be straight, and their direction would pass through the origin; they would be very nearly prolongations of the planetary lines. Such an aspect of the lines as this could be recognized on my photographs at a glance.

The direction of a line free from displacement was obtained by photographing the spectrum of the full moon on the same plate, on each side of the spectrum of Saturn.

For further details, with the numerical results of measurement of the plates, I must refer to the May number of the *Astrophysical Journal*, in which I have described these observations at some length.

James E. Keeler.
Allegheny Observatory.

A General Subject-Index to Periodical Scientific Literature.

The Editor of Science—*My Dear Sir:* I notice that you are printing in Science various replies to the circular of the Royal Society of London relating to the matter of a general subject-index to all scientific publications. Your correspondents have so far been in favor of such an undertaking. As I do not believe it to be practicable, it may be of interest to some of your readers to see my own reply which I venture to send herewith. I have made a few trifling changes in the copy which I enclose.

I am, very respectfully,
Edward S. Holden.

The Lick Observatory,
March 30, 1895.

Mount Hamilton, April 24, 1894.

To Professor M. Foster, *Secretary R. S.*,
Chairman of the Committee on a Subject-Index, etc., etc.

My Dear Sir: I beg to acknowledge receipt of the circular of April 6 relating to a pro-